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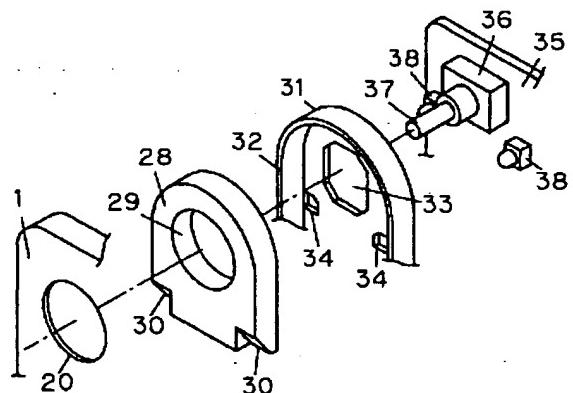
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(54)【発明の名称】電子機器の操作釦照明装置

(57)【要約】

【課題】車載用音響機器などの電子機器の操作釦を照明する際に、少ない発光素子で均一に照明できる電子機器の操作釦照明装置を提供する。

【解決手段】プリント基板35に取付けられた発光素子38から出た光の前方への透過範囲を遮光板31の小孔34で制限し、この小孔34を介した光を光誘導板28の傾斜面で反射させて誘導板全体に光を誘導するものであり、発光素子38から出た光により前面板1の孔20と操作釦3との隙間が均一に照明されるものである。



【特許請求の範囲】

【請求項1】 基板に固定された電子部品と、上記基板に取付けられた発光素子と、上記電子部品の軸が貫通する孔及び上記発光素子から出た光の透過範囲を制限する小孔が形成された遮光板と、上記電子部品の軸が貫通する孔及び上記小孔を透過した光を反射する傾斜面が形成された光誘導板と、上記電子部品の軸が貫通する孔が形成された前面板と、上記前面板の孔を貫通した軸の先端に取付けられた操作釦とを有し、上記前面板の孔と上記操作釦との間の隙間を照明することを特徴とする電子機器の操作釦照明装置。

【発明の詳細な説明】

【0001】

【発明の属する技術分野】 本発明は、車載用音響機器などの電子機器の操作釦を照明する電子機器の操作釦照明装置に関する。

【0002】

【従来の技術】 図1は、車載用音響機器の正面を示している。図1において、1は装置本体2の前面板(エスカッシュン)、3は音量を調整するための操作釦、4はカセットを挿入するカセット挿入口、5はラジオ受信時には受信周波数帯域(AM, FM)、受信周波数などを表示し、カセットデッキ動作時には動作モード、テープ走行方向などを表示する表示装置、6～11はプリセット選局用の操作釦、12～17はラジオ受信機又はカセットデッキの各動作を制御するための操作釦、18, 19は音質調整用の操作釦である。

【0003】 図6～図9は、上記車載用音響機器の操作釦照明装置を示している。図6～図9において、20は前面板1に形成された孔、21は前面板20の背面に係止爪(図示せず)で係止される光誘導板であり、この光誘導板21には孔22が形成されている。23は上記前面板1の背面にネジ止めされるプリント基板であり、このプリント基板23には音量調整用の可変抵抗器24が半田付けされている。25は可変抵抗器24の回転軸である。26はプリント基板23に半田付けされた発光素子であり、この発光素子26は可変抵抗器24の周囲に4個配置されている。図6, 図7に示すように、光誘導板21を前面板1の背面に係止し、プリント基板23を前面板1の背面にネジ止めした状態においては、可変抵抗器24の回転軸25が光誘導板21の孔22、前面板1の孔20を貫通して前方に突出する。この回転軸25に操作釦3が取付けられる。光誘導板21の後部に配置された発光素子26から出た光は、光誘導板21に入り、光誘導板21の前面より出て孔20と操作釦3との隙間27を照明するものである。

【0004】

【発明が解決しようとする課題】 しかしながら、上記従来の操作釦照明装置は、発光素子26を4個使用しているにもかかわらず、孔20と操作釦3との間のリング状

の隙間27の中で、発光素子26が配置された前方部分(斜線部分a, b, c, d)が明るくなり、他の部分が暗くなり隙間27を均一に照明することができないものであった。よって、上記従来例では、操作釦の外周部分を均一に照明できないという問題があった。

【0005】 本発明は、上記従来の問題点を解決するものであり、操作釦の照明を均一に行うことができる電子機器の操作釦照明装置を提供するものである。

【0006】

10 【課題を解決するための手段】 本発明は、上記目的を達成するために、発光素子から出る光の透過範囲を制限する小孔が形成された遮光板を設けるとともに、発光素子からの光を光誘導板の傾斜面で反射させて光を光誘導板全体に誘導させるものである。

【0007】 本発明によれば、少ない発光素子を使用しながら操作釦を均一に照明できるものである。

【0008】

【発明の実施の形態】 本発明の請求項1記載の発明は、基板に固定された電子部品と、上記基板に取付けられた発光素子と、上記電子部品の軸が貫通する孔及び上記発光素子から出た光の透過範囲を制限する小孔が形成された遮光板と、上記電子部品の軸が貫通する孔及び上記小孔を透過した光を反射する傾斜面が形成された光誘導板と、上記電子部品の軸が貫通する孔が形成された前面板と、上記前面板の孔を貫通した軸の先端に取付けられた操作釦とを有し、上記前面板の孔と上記操作釦との間の隙間を照明することを特徴とするものであり、少ない発光素子を使用しながら操作釦を均一に照明できるという作用を有する。

30 【0009】 以下に、本発明の実施の形態について、図1～図5とともに説明する。

(実施の形態1) 図1～図5において、20は前面板1に形成された孔、28は光誘導板であり、この光誘導板28には孔29が形成されている。30は光誘導板28の下部の左右に形成された傾斜面である。31は遮光板であり、この遮光板31の外周には上記光誘導板28の外形と同様の突条32が形成されている。33は遮光板31に形成された孔、34は遮光板31の下部の左右に形成された小孔である。上記光誘導板28は上記遮光板

40 31の前面に係止爪(図示せず)により係止され、また遮光板31は前面板1の後面にネジ止めされる。35はプリント基板であり、このプリント基板35には可変抵抗器36が半田付けされている。37は上記可変抵抗器36の回転軸である。38はプリント基板35に半田付けされた発光素子であり、この発光素子38は可変抵抗器36の下部の左右に配置されている。上記プリント基板35は前面板1の後面にネジ止めされる。遮光板31の孔33、光誘導板28の孔29、前面板1の孔20を貫通して前面板1より前方に突出した可変抵抗器36の回転軸37には操作釦3が取付けられるものである。

【0010】図2～図5において、発光素子38から出した光は、遮光板31に形成された小孔34を通り光誘導板28に入射する。光誘導板28に入射した光は光誘導板28の傾斜面30で反射され、光誘導板28の上方に誘導される。光誘導板28の前面より出た光により、前面板1の孔20と操作釦3との隙間39が照明されるものである。

【0011】上記のように、発光素子38から出した光を遮光板31の小孔34で絞り、光誘導板28に入射させ、傾斜面30で反射させて光誘導板28全体に誘導させるため、前記従来例に比較して少ない発光素子を使用しながら、前面板1の孔20と操作釦3との隙間39を均一に照明できるものである。

【0012】なお、上記実施の形態は、可変抵抗器36の回転軸37に取付けられた操作釦3を照明する例であるが、スイッチなどの電子部品の駆動軸に操作釦を取り付けるこの操作釦を照明する場合にも本発明を適用することができるものである。

【0013】

【発明の効果】以上のように本発明は、発光素子から出る光の透過範囲を制限する小孔が形成された遮光板を設けるとともに、発光素子からの光を光誘導板の傾斜面で反射させて光を光誘導板全体に誘導させることにより、

少ない発光素子で前面板の孔と操作釦との隙間を均一に照明することができる利点を有するものである。

【図面の簡単な説明】

【図1】本発明の一実施の形態における操作釦照明装置を具備した電子機器の正面図

【図2】同実施の形態の操作釦照明装置の分解斜視図

【図3】同実施の形態の操作釦照明装置の断面図

【図4】同実施の形態の操作釦照明装置の断面図

【図5】同実施の形態の操作釦照明装置の正面図

10 【図6】従来の操作釦照明装置の分解斜視図

【図7】同従来の操作釦照明装置の断面図

【図8】同従来の操作釦照明装置の断面図

【図9】同従来の操作釦照明装置の正面図

【符号の説明】

1 前面板

20 20 孔

21 光誘導板

22 孔

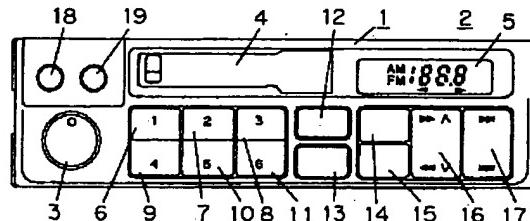
23 プリント基板

24 可変抵抗器

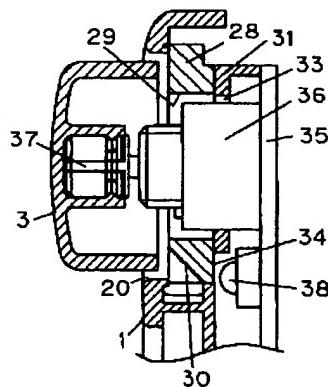
25 回転軸

26 発光素子

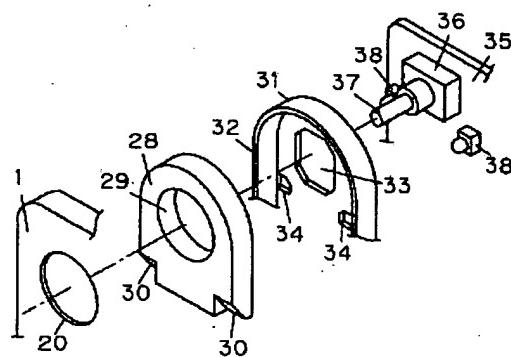
【図1】



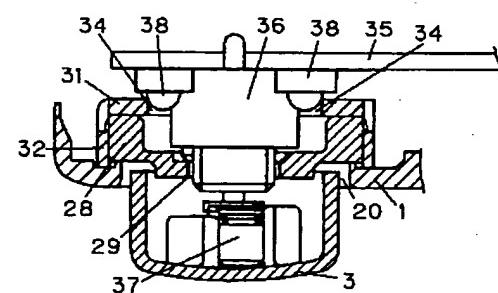
【図3】



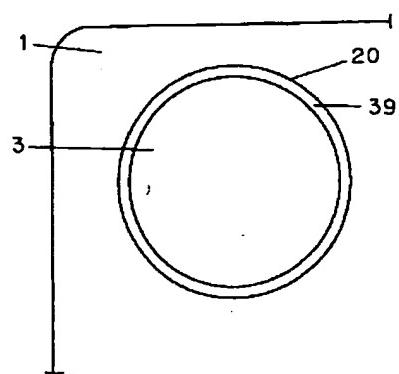
【図2】



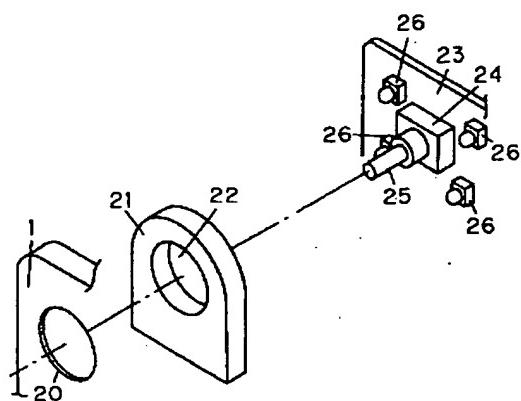
【図4】



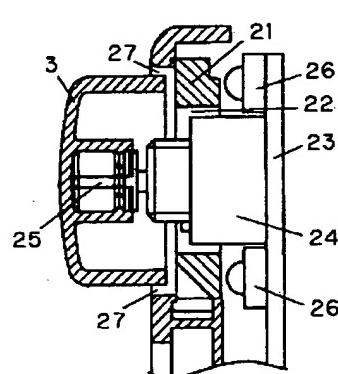
【図5】



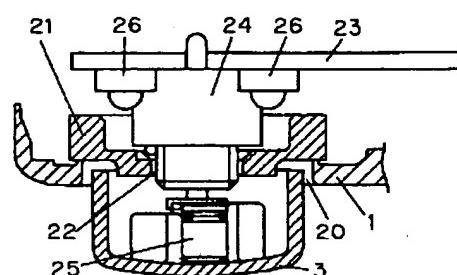
【図6】



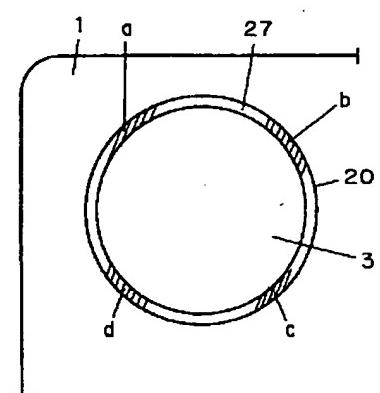
【図7】



【図8】



【図9】



Date: January 14, 2004

Declaration

I, Michihiko Matsuba, President of Fukuyama Sangyo Honyaku Center, Ltd., of 16-3, 2-chome, Nogami-cho, Fukuyama, Japan, do solemnly and sincerely declare that I understand well both the Japanese and English languages and that the attached document in English is a full and faithful translation, of the copy of Japanese Unexamined Patent No. Hei-9-180572 laid open on July 11, 1997.



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OPERATION BUTTON LIGHTING DEVICE FOR ELECTRONIC APPARATUS

Japanese Unexamined Patent No. Hei-9-180572

Laid-open on: July 11, 1997

Application No. Hei-7-334565

Filed on: December 22, 1995

Inventor: Kotaro OKURA

Applicant: Matsushita Electric Industrial Co., Ltd.

SPECIFICATION

[TITLE OF THE INVENTION] Operation Button Lighting Device for
Electronic Apparatus

[Abstract]

[Problem] To provide an operation button lighting device for an electronic apparatus that allows, when the operation button of an electronic apparatus (e.g., in-vehicle acoustic device) is lighted, a small number of light emitting elements to provide lighting to the operation button in an even manner.

[Means for Solving the Problem] The transmission range in the forward direction of light coming from the light emitting element 38 attached to the print circuit board 35 is limited by the small hole 34 of the light shielding plate 31. Light coming through this small hole 34 is reflected by the inclined

plane of the light guiding plate 28 so that light is guided to the entirety of the guiding plate, thereby allowing light coming from the light emitting element 38 to light the clearance between the hole 20 of the front face plate 1 and the operation button 3 in an even manner.

[WHAT IS CLAIMED IS;]

[Claim 1] An operation button lighting device for an electronic apparatus, comprising;

an electronic component fixed to a circuit board;

a light emitting element attached to the circuit board;

a light shielding plate in which a hole through which the shaft of the electronic component penetrates and a small hole for limiting the transmission range of light coming from the light emitting element are formed;

a light guiding plate in which an inclined plane for reflecting light transmitted through the hole through which the shaft of the electronic component penetrates and the small hole is formed;

a front face plate in which a hole through which the shaft of the electronic component penetrates is formed; and

an operation button attached to the tip end of the shaft penetrating the hole of the front face plate;

wherein lighting is provided to the clearance between

the hole of the front face plate and the operation button.

[DETAILED DESCRIPTION OF THE INVENTION]

[0001]

[Field of the Invention]

The present invention relates to an operation button lighting device for an electronic apparatus for lighting an operation button of an electronic apparatus (e.g., in-vehicle acoustic device).

[0002]

[Prior Art]

Fig. 1 is a front view of an in-vehicle acoustic device. In Fig. 1, "1" denotes a front face plate (escutcheon) of the apparatus main body 2; "3" denotes an operation button for adjusting volume; "4" denotes a cassette insertion opening to which a cassette is inserted; "5" denotes a display apparatus for displaying, when a radio frequency is received, a reception frequency band (AM, FM), a reception frequency or the like and for displaying, when a cassette deck is operated, the operation mode, running direction of the tape or the like; "6" through "11" denote an operation button for preset tuning; "12" through "17" denote an operation button for controlling the operation of a radio receiver or the cassette deck; and "18" and "19" denote the operation button for adjusting sound quality.

[0003]

Fig. 6 through Fig. 9 show the operation button lighting device of the above-described in-vehicle acoustic device. In Fig. 6 through Fig. 9, "20" denotes a hole formed in the front face plate 1; "21" denotes a light guiding plate latched with the back face of the front face plate 20 by a latch (not shown) and this light guiding plate 21 is provided with a hole 22. "23" denotes a print circuit board screwed to the back face of the above-described front face plate 1 and a variable resistor 24 for adjusting volume is formed in this print circuit board 23; "25" denotes a rotation axis of the variable resistor 24; and "26" denotes a light emitting element soldered to the print circuit board 23 and four light emitting elements 26 are disposed around the variable resistor 24. As shown in Fig. 6 and Fig. 7, in a state where the light guiding plate 21 is latched to the back face of the front face plate 1 and the print circuit board 23 is screwed to the back face of the front face plate 1, the rotation axis 25 of the variable resistor 24 penetrates the hole 22 of the light guiding plate 21 and the hole 20 of the front face plate 1 to protrude in the forward direction. This rotation axis 25 is attached with the operation button 3. Light going through the light emitting element 26 provided at the rear part of the light guiding plate

21 enters the light guiding plate 21 and goes out from the front face of the light guiding plate 21, thereby providing light to a clearance 27 between the hole 20 and the operation button 3.

[0004]

[Themes to be Solved by the Invention]

However, in spite of the fact that the above-described conventional operation button lighting device uses four light emitting elements 26, provided lighting to the ring-shaped clearance 27 between the hole 20 and the operation button 3 in such a manner that the front part in which the light emitting element 26 is disposed (shaded parts, a, b, c, and d) are lighted although the other parts are not lighted, thus preventing the clearance 27 from being evenly lighted. Thus, the above-described conventional example had a problem in which the outer circumference of the operation button cannot be evenly lighted.

[0005]

The present invention is made for solving the above-described conventional problem and provides an operation button lighting device for an electronic apparatus that can provide lighting to the operation button in an even manner.

[0006]

[Means for Solving Themes]

In order to achieve the above-described object, in the present invention, the light shielding plate in which the small hole is formed for limiting the transmission range of the light coming from the light emitting element is provided and the light from the light emitting element is allowed to be reflected by the inclined plane of the light guiding plate so that the light is guided to the entirety of the light guiding plate.

[0007]

The present invention allows a small number of light emitting elements to be used for lighting the operation button in an even manner.

[0008]

[Preferred Embodiments]

The invention according to Claim 1 of the present invention comprising: an electronic component fixed to a circuit board; a light emitting element attached to the circuit board; a light shielding plate in which a hole through which the shaft of the electronic component penetrates and a small hole for limiting the transmission range of light coming from the light emitting element are formed; a light guiding plate in which an inclined plane for reflecting light transmitted through the hole through which the shaft of the electronic component penetrates is formed and the small hole is formed;

a front face plate in which the hole through which the shaft of the electronic component penetrates is formed; and an operation button attached to the tip end of the shaft penetrating the hole of the front face plate; wherein lighting is provided to the clearance between the hole of the front face plate and the operation button, thereby allowing a small number of light emitting elements to be used for providing lighting to the operation button in an even manner.

[0008]

Hereinafter, an embodiment of the present invention will be described with reference to Fig. 1 to Fig. 5.

(Embodiment 1)

[0009]

In Fig. 1 through Fig. 5, "20" denotes a hole provided in the front face plate 1; "28" denotes a light guiding plate and a hole 29 is formed in this light guiding plate 28; "30" denotes inclined planes provided at the left and right of the lower part of the light guiding plate 28; "31" denotes a light shielding plate and at the outer circumference this light shielding plate 31, a projection 32 having the same shape as that of the above-described light guiding plate 28 is formed; "33" denotes a hole provided in the light shielding plate 31; and "34" denotes small holes provided at the left and right

of the lower part of the light shielding plate 31. The above-described light guiding plate 28 is latched to the front face of the above-described light shielding plate 31 by a latch (not shown). The light shielding plate 31 is screwed to the rear face of the front face plate 1. "35" denotes a print circuit board and a variable resistor 36 is formed on this print circuit board 35. "37" denotes the rotation axis of the above-described variable resistor 36. "38" denotes a light emitting element soldered to the print circuit board 35 and the light emitting elements 38 are provided at the left and right of the lower part of the variable resistor 36. The above-described print circuit board 35 is screwed to the rear face of the front face plate 1. To the rotation axis 37 of the variable resistor 36 that penetrates the hole 33 of the light shielding plate 31, the hole 29 of the light guiding plate 28, and the hole 20 of the front face plate 1 to protrude from the front face plate 1 in the forward direction, the operation button 3 is attached.

[0010]

In Fig. 2 through Fig. 5, light coming from the light emitting element 38 is sent through the small hole 34 provided in the light shielding plate 31 and then enters the light guiding plate 28. Light that has entered the light guiding

plate 28 is then reflected by the inclined plane 30 of the light guiding plate 28 and is guided toward the above-described part of the light guiding plate 28. Light going out of the front face of the light guiding plate 28 provides lighting to the clearance 39 between the hole 20 of the front face plate 1 and the operation button 3.

[0011]

As described above, light coming from the light emitting element 38 is focused by the small hole 34 of the light shielding plate 31 and then is allowed to enter the light guiding plate 28, therefore, the light is reflected by the inclined plane 30 to be guided to the entirety of the light guiding plate 28, thereby allowing a smaller number of light emitting elements as compared to the case of the above-described conventional example to provide lighting to the clearance 39 between the hole 20 of the front face plate 1 and the operation button 3 in an even manner.

[0012]

Although, in the above-described embodiment, a case in which lighting was provided to the operation button 3 attached to the rotation axis 37 of the variable resistor 36, the present invention may also be applied to a case where the operation button is attached to the driving shaft of an electronic

component (e.g., switch) and this operation button is lighted.

[0013]

[Effects of the Invention]

As described above, the present invention has an advantage in that the light shielding plate in which the small hole is formed for limiting the transmission range of the light coming from the light emitting element is provided and the light from the light emitting element is allowed to be reflected by the inclined plane of the light guiding plate so that the light is guided to the entirety of the light guiding plate, thereby allowing a small number of light emitting elements to provide lighting to the clearance between the hole of the front face plate and the operation button in an even manner.

[BRIEF DESCRIPTION OF THE DRAWINGS]

[Fig. 1] Front view of an electronic apparatus including the operation button lighting device according to one embodiment of the present invention.

[Fig. 2] Exploded perspective view of the operation button lighting device according to the embodiment of the present invention.

[Fig. 3] Cross-sectional view of the operation button lighting device according to the embodiment of the present invention.

[Fig. 4] Cross-sectional view of the operation button lighting device according to the embodiment of the present invention.

[Fig. 5] Front view of the operation button lighting device according to one embodiment of the present invention.

[Fig. 6] Exploded perspective view of a conventional operation button lighting device according to the embodiment of the present invention.

[Fig. 7] Cross-sectional view of the conventional operation button lighting device according to the embodiment of the present invention.

[Fig. 8] Cross-sectional view of the conventional operation button lighting device according to the embodiment of the present invention.

[Fig. 9] Front view of the conventional operation button lighting device according to the embodiment of the present invention.

[Description of Symbols]

1 front face plate

20 hole

21 light guiding plate

22 hole

23 print circuit board

24 variable resistor

25 rotation axis

26 light emitting element

Fig.1

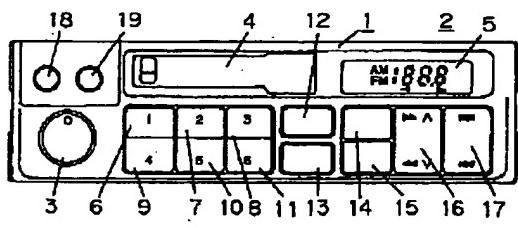


Fig.2

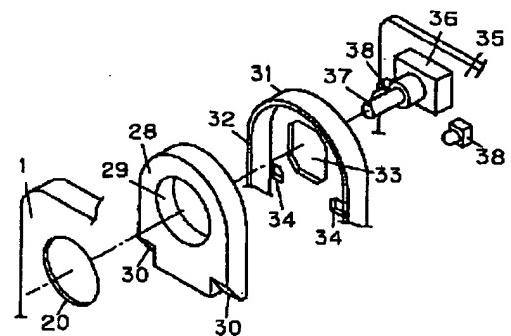


Fig.3

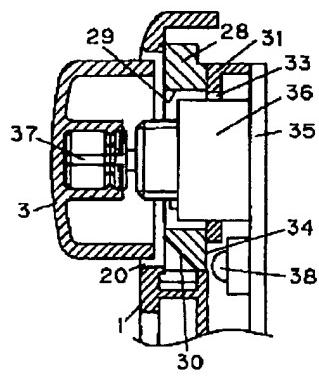


Fig.4

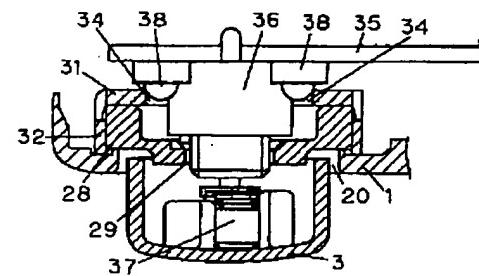


Fig.5

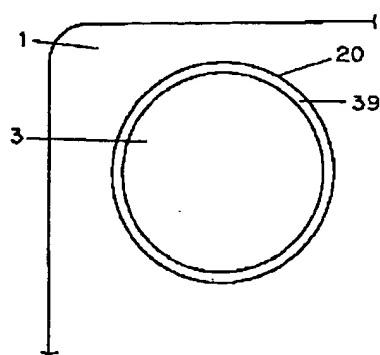


Fig.6

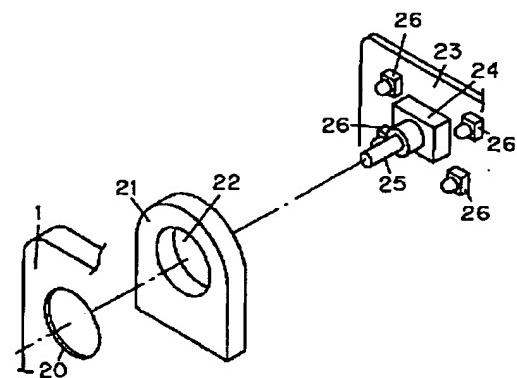


Fig.7

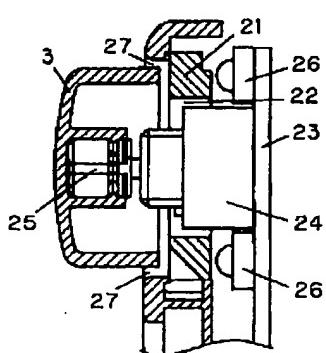


Fig.8

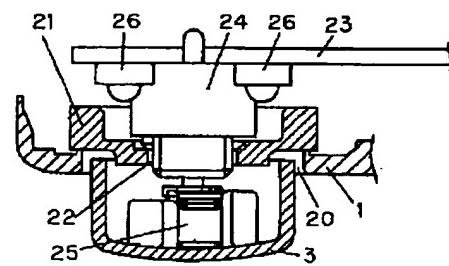


Fig.9

